Antibiotic Guidelines for Dentistry:

Who, When, What, Why and How to Prescribe

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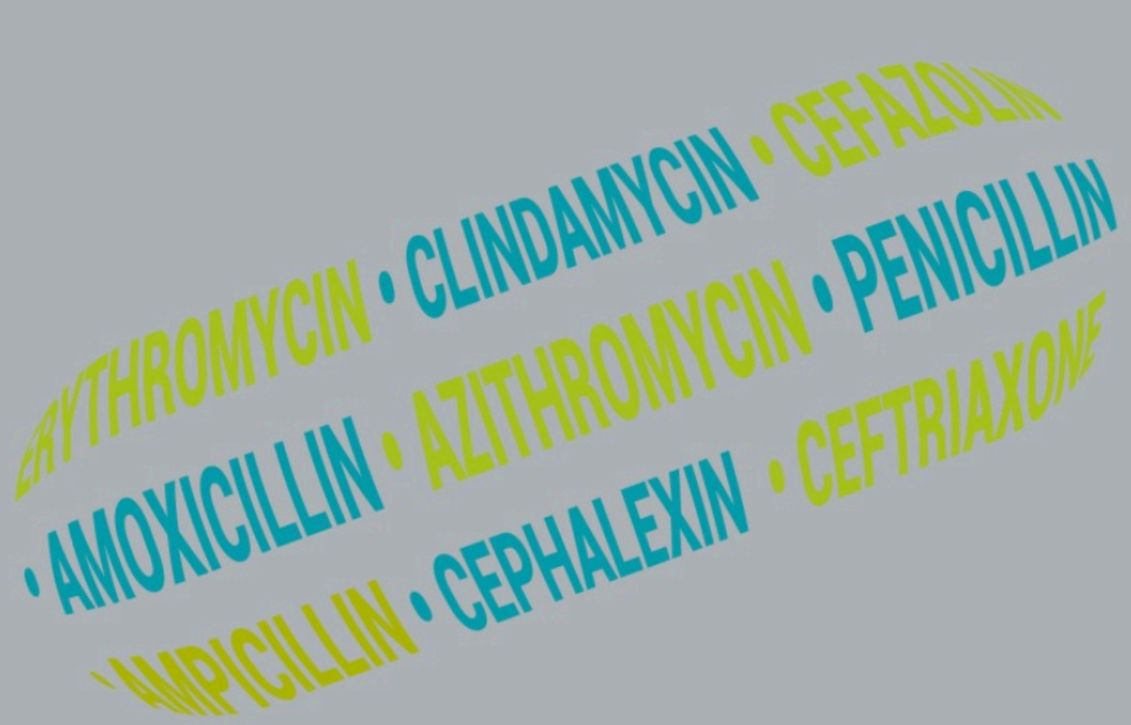

Antibiotic stewardship programs help ensure that antibiotics are prescribed only when needed, minimizing misdiagnoses and helping to ensure that the right drug, dose, and duration are selected when an antibiotic is needed.[2] Stewardship principles apply to all antibiotic prescriptions including those for prophylactic and treatment purposes. Elements of stewardship are covered in the new ADA guidelines, supporting the ADA's commitment to the U.S. Antimicrobial Resistance Challenge (see: https://www.cdc.gov/drugresistance/intl-activities/amr-challenge.html). Collectively, the new guideline for treatment of oral infections encourages a paradigm shift in the use of antibiotics in dentistry from a "just in case" approach to using only when absolutely necessary.

Antibiotic prophylaxis coverage for patients with prosthetic joints

Providers may be under the impression that there are discrepancies in antibiotic prophylaxis recommendations made by the American Academy of Orthopaedic Surgeons (AAOS) and the ADA. However, in 2012 the AAOS collaborated with the ADA to update the AAOS guidelines for antibiotic prophylaxis in patients with prosthetic joints undergoing a dental procedure. Importantly, the joint guideline advised against routine prophylaxis. In 2015, the ADA Council on Scientific Affairs

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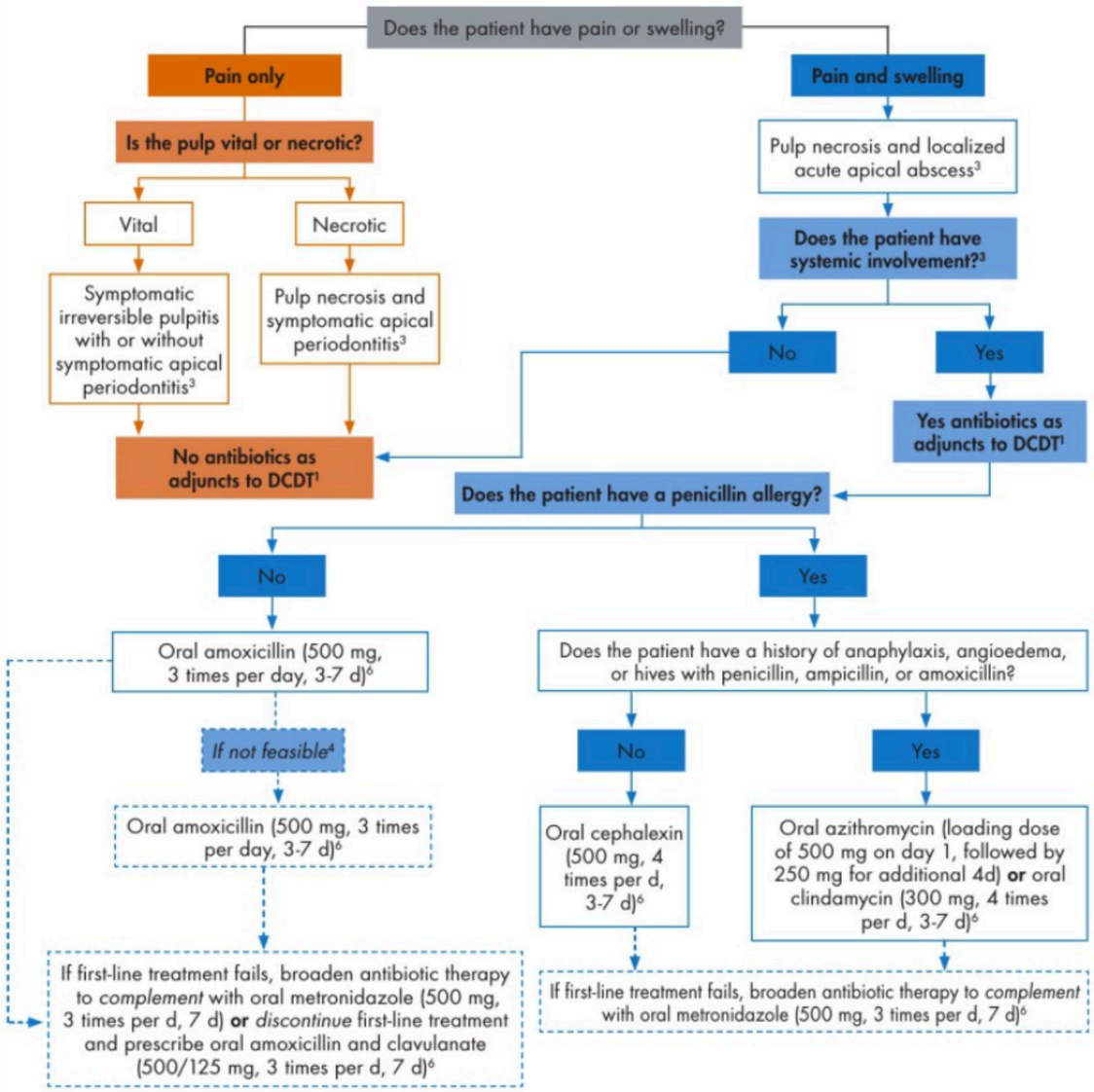
Background: This article is the second in a series to discuss antibiotic stewardship efforts in the dental profession. The first article (published in the MDA *Journal* in October 2019) focused upon the core elements of an antibiotic stewardship program as developed by the Centers for Disease Control and Prevention.[1,2] As core elements are primarily focused on programs for larger institutions and health systems, and therefore not entirely applicable to private practitioners, opportunities and challenges for stewardship efforts were addressed. This article will review indications for prophylactic antibiotics and introduce the recently published American Dental Association guidelines for the treatment of oral infections.[3]

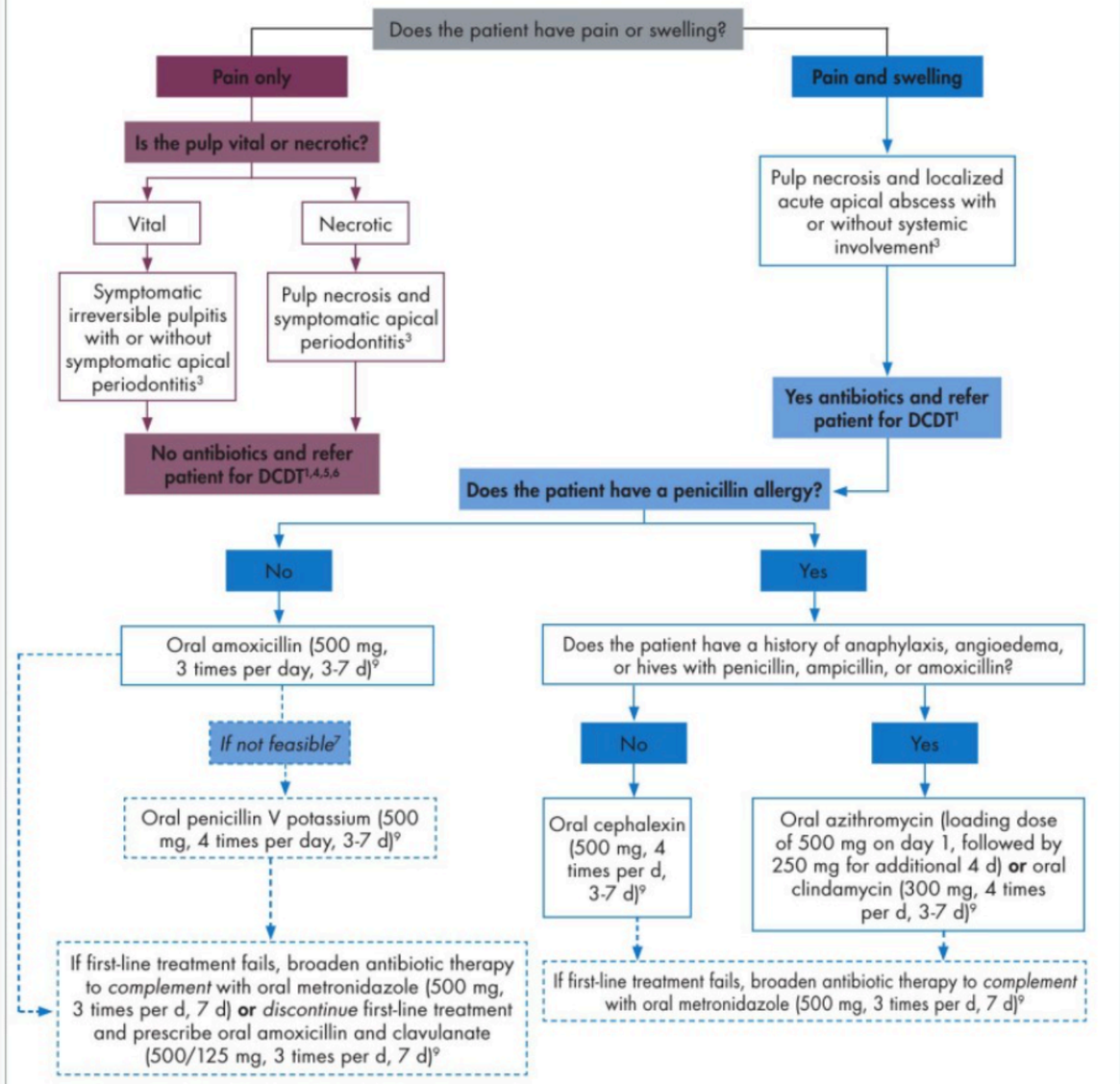
Abstract: The purpose of this article is to review indications for prophylactic antibiotics and familiarize the reader with the new ADA guidelines for the treatment of oral infections. Adverse reactions to antibiotic use, such as allergic reactions and the risk of *Clostridioides difficile* (formerly *Clostridium difficile*), infection will be discussed. Resources will be introduced to help dental clinicians implement the new guidelines. Tools, literature, and educational resources for the entire dental team and their patients will be provided to promote antibiotic stewardship principles.

Figure 1 — Immunocompetent[2] adult patient seeks treatment in a dental setting with an urgent pulpal or periapical condition and definitive, conservative dental treatment (DCDT)1 is immediately available



Source: ADA Chairside Guide (available for download at https://ebd.ada.org

Figure 2 — If pulpotomy, nonsurgical root canal treatment, or incision and drainage (DCDT) is not immediately available



Source: ADA Chairside Guide (available for download at https://ebd.ada.org

updated and clarified the recommendations, stating that "for patients with prosthetic joint implants, prophylactic antibiotics are generally not recommended prior to dental procedures to prevent prosthetic joint infections."[4] For patients with a history of complications associated with their joint replacement surgery who are undergoing dental procedures that include gingival manipulation or mucosal incision, prophylactic antibiotics should only be considered after consultation with the patient and the orthopedic surgeon.

In 2017, the AAOS developed Appropriate Use Criteria (AUC) for management of orthopaedical implants undergoing dental procedures.[5] The AUC clarifies the patient profile, based upon length of time since joint replacement and other risk factors, of those who may be a candidate for prophylactic antibiotics. Antibiotic recommendations are included, noting that clindamycin and cefazolin are no longer included "based on more recently published evidence." The AUC is available as a web-based application allowing the input of patient risk factors to help determine the appropriateness of antibiotic prophylaxis (Table 3, see Pages 35 and 36).

Antibiotic prophylaxis coverage for patients with cardiac conditions

For infective endocarditis prophylaxis, current guidelines support premedication for only a small subset of patients.[6] After a review of scientific evidence, it was deemed that the risk of adverse reactions to antibiotics generally outweighs the benefits of prophylaxis for many patients who were once eligible for prophylaxis in previous guideline versions. It is interesting to note that concern about the development of drug-resistant bacteria was also a factor in the revision of these guidelines.

The following recommendations are taken from 2017 American Heart Association and American College of Cardiology for Management of Patients with Valvular Disease.[7] Current infective endocarditis/valvular heart disease guidelines state that use of prophylactic antibiotics is reasonable for patients with:

1. Prosthetic cardiac valves, including transcatheter-implanted prostheses and homografts.
2. Prosthetic material used for cardiac valve repair, such as annuloplasty rings and chords.
3. Previous infective endocarditis.
4. Unrepaired cyanotic congenital heart disease or repaired congenital heart disease, with residual shunts or valvular regurgitation at the site of or adjacent to the site of a prosthetic patch or prosthetic device.
5. Cardiac transplant with valve regurgitation due to a tructurally abnormal valve.

Note: A complete description of indications for antibiotic prophylaxis may be found at American Dental Association, Antibiotic Prophylaxis prior to Dental Procedures (See Table 3, see Pages 35 and 36).

Table 1 — Antibiotic Prophylactic Regimens for Dental Procedures, single dose administered 30-60 minutes prior to procedure (AAOS update of 2007 AHA guidelines)

Situation	Agent*	Adults	Children
Oral	Amoxicillin	2 gm	50 mg/kg
Unable to take oral medication	Ampicillin OR Ceftriaxone	2 gm IM or IV 1 gm IM or IV	50 mg/kg IM or IV 50 mg/kg IM or IV
Allergic to PCN – oral	**Cephalexin OR Azithromycin	2 gm 500 mg	50 mg/kg 15 mg/kg
Allertic to PCN and unable to take oral	Ceftriaxone	1 gm IM or IV	50 mg/kg IM or IV

*In 2016, AAOS removed clindamycin as an option due to emerging data associating its use with *C. difficile* diarrhea.
**Cephalosporins should be avoided in patients with a history of anaphylaxis to penicillin.

Antibiotic regimens for prophylaxis (see Table 1)

Amoxicillin 2 gm as a single dose 30-60 minutes prior to the dental procedure is recommended for most patients. In patients with a penicillin allergy, there are limited options that will be discussed in more detail below. For all agents, the single dose should be administered 30 to 60 minutes prior to the procedure. However, if that dose is missed, it may be administered up to two hours after the procedure. In addition, for patients already receiving an antibiotic that is also recommended for infective endocarditis prophylaxis, a drug should be selected from a different class.

Guidelines for antibiotic use for the treatment of oral infections

On Oct. 25, 2019, the American Dental Association published guidelines on antibiotic use for the treatment of oral dental infections.[3] These guidelines formulate clinical recommendations for the urgent management of various dental infections either alone or as adjunct to definitive, conservative dental treatment in immunocompetent adults.

To formulate the guidelines on antibiotic use for urgent management of pulpal- and periapical-related dental pain and intraoral swelling, a multidisciplinary panel of academic and clinical experts was convened to evaluate the evidence related to the management of oral infections. Five targeted conditions were researched and addressed, including: (1) symptomatic irreversible pulpitis; (2) symptomatic apical periodontitis; (3) pulp necrosis and symptomatic apical periodontitis; (4) pulp necrosis and localized acute apical abscess; and (5) acute apical abscess with systemic involvement. Recommendations for use of antibiotics are predicated by whether or not an appropriate intervention (pulpotomy, pulpectomy, nonsurgical root canal treatment, or incision and drainage) could be performed the same day as the infection is diagnosed. These interventions are referred to as *definitive, conservative dental treatment (DCDT).* Figure 1 on Page 30 shows the algorithm if DCDT is available the same day. Figure 2 on Page 31 shows recommendations if DCDT must be referred or delayed. The guidelines advise against using antibiotics for most pulpal and periapical

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Table 2 — Antibiotic Regimens for Oral Infections (See Figures 1 and 2 for additional details including when other agents should be added)

Situation	Agent*	Dose*
Not allergic to PCN	Amoxicillin OR Penicillin VK	500 mg 3x/day 500 mg 4x/day
PCN allergy **without** history of anaphylaxis, angioedema, or hives	Cephalexin	500 mg 4x/day
PCN allergy **with** history of anaphylaxis, angioedema, or hives	Azithromycin OR Clindamycin	500 mg on day 1 then 250 mg daily x4 days 300 mg 4x/day

*With exception of azithromycin, all agents should be prescribed for 3-7 days and should be discontinued after the patient's symptoms have resolved for 24 hours.

conditions, and instead recommend only the use of dental treatment and, if needed, over-the-counter pain relievers such as acetaminophen or ibuprofen.[3]

Selection of the right antibiotic, and right dose for the treatment of oral infections (see Table 2, see Page 33)

In situations where antibiotics are indicated for the treatment of dental infections, amoxicillin 500 mg three time a day for three to seven days is the preferred regimen. Amoxicillin is preferred over penicillin due to overall better tolerability and improved compliance with less frequent dosing.

For patients who report a penicillin allergy, all health care professionals are urged to further evaluate the patient's allergy history, keeping in mind that fewer than 1% of the population experience a true IgE-mediated reaction to penicillins.[8] If the patient does not report a history of type 1 hypersensitivity (anaphylaxis, angioedema or hives) with penicillin, ampicillin or amoxicillin, then cephalexin is recommended.

In patients reporting a type 1 hypersensitivity reaction to penicillin, azithromycin is recommended as first-line treatment, with clindamycin being an alternative choice. Clindamycin is a popular antibiotic in dentistry given its spectrum of activity, which includes anaerobic coverage. It is interesting to note that clindamycin has historically only been indicated in dental patients with a penicillin allergy (e.g., ~1% of the population), yet the CDC reports that clindamycin is prescribed in about 15% of dental cases.[9] In surveys conducted by the Michigan Antibiotic Resistance Reduction Coalition (MARR), the percentage of dental patients receiving clindamycin in Michigan appears to be even higher.

Unfortunately, the anaerobic coverage is not confined to the oral flora, and clindamycin may have significant impact on the gut microbiome, which puts patients at risk of antibiotic-associated diarrhea, including *Clostridiodes difficile* diarrhea. Over the past several years, a significant increase in community-acquired *C. diff* diarrhea has been observed, and dental antibiotic prescribing, particularly clindamycin, has contributed to this increase.[10] For this reason, the American Association of Orthopaedic Surgeons has removed clindamycin as an option in its guidelines for management of patients with orthopaedic implants undergoing dental procedures.[5] The ADA preferentially positions azithromycin over clindamycin and offers the following warning in regards to prescribing clindamycin for oral infections:

"…clindamycin substantially increases the risk of developing Clostridioides difficile infection even after a single dose. . . . clindamycin has a U.S. Food and Drug Administration black box warning for c. difficile infection, which can be fatal. Patients should be instructed to call their primary care provider if they develop fever, abdominal cramping, or ≥ 3 loose bowel movements per day."[3]

The Peggy Lillis Foundation is a nationwide *Clostridiodes difficile* awareness movement focused on educating the public about this potentially deadly infection. Peggy Lillis was a 56-year-old school teacher who died eight days after receiving the first dose of clindamycin for the treatment of a dental abscess. Peggy's story echoes the stories of many other people impacted by *Clostridioides difficile* infection. Information on the disease may be accessed on the Peggy Lillis Foundation website.

Although there are no published data on macrolide (e.g., erythromycin, azithromycin) resistance related to oral infections, the ADA recommends close monitoring of patients receiving azithromycin due to concern over the development of resistance. This is a legitimate concern given the high rate of resistance reported among Group A *Streptococci* (GAS), which causes strep throat. The CDC reports that in 2017, 23% of invasive GAS infections were resistant to erythromycin, nearly three times the rate of resistance that was observed in 2010. Additionally, in the United States azithromycin is the no. 1 prescribed outpatient antibiotic, accounting for 54.1 million prescriptions in 2011.[11]

Approximately 80% of patients with IgE-mediated penicillin allergy lose their sensitivity after 10 years, and therefore it is prudent for future antibiotic use to encourage patients with a remote history of penicillin allergy to consult with an allergist.[8] This is especially important with older adults who may have chronic illnesses, as they are at higher risk of developing infections and may benefit from the life-saving properties of beta-lactam antibiotics.

The guidelines recommend that patients with oral infections who receive antibiotics should be reevaluated after three days of therapy. If the infection is not resolving, then metronidazole may be added. Alternatively, if the patient has been receiving amoxicillin or penicillin, those agents can be discontinued and replaced with amoxicillin/clavulanate.

Selecting the right duration

Regardless of the antibiotic prescribed, the maximum duration of therapy is seven days (five days for azithromycin due to its long half-life), and patients should be told to discontinue antibiotics after 24 hours of symptom resolution. The goal of shorter duration of therapy is to minimize side effects and potential for development of antibiotic resistance. This approach has been utilized by other health care professionals during antibiotic therapy for a variety of infections, including some associated with significant morbidity and mortality. For example, the recommended duration of antibiotics in community acquired pneumonia has declined from 10 to 14 days to five to seven

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Table 3 — Resources to Promote Antibiotic Stewardship in Dentistry

Title	Website	Resources Provided
American Dental Association		
Antibiotic Use for the Urgent Management of Dental Pain and Intra-Oral Swelling Clinical Practice Guideline	https://ebd.ada.org/en/evidence/guidelines/antibiotics-for-dental-pain-and-swelling	Provides many resources for dentists and patients, including links to published guideline,[3] algorithms with antibiotic dosing recommendations, a personalized clinical recommendation online tool, and a patient video
Antibiotic Prophylaxis Prior to Dental Procedures	https://www.ada.org/en/member-center/oral-health-topics/antibiotic-prophylaxis	Oral Health Topic reviews recommendations for prophylaxis Includes link to ADA Chairside Guide
Centers for Disease Control and Prevention		
Checklist for Antibiotic Prescribing in Dentistry	https://www.cdc.gov/antibiotic-use/community/downloads/dental-fact-sheet-FINAL.pdf	Summary of stewardship principles to consider when prescribing antibiotics
Antibiotic Stewardship Training Series	https://www.train.org/cdctrain/training_plan/3697	Web-based self-study continuing education series that includes a module on dental antibiotic stewardship
Evaluation and Diagnosis of Penicillin Allergy for Health Care Professionals	https://www.cdc.gov/antibiotic-use/community/for-hcp/Penicillin-Allergy.html	Recommendations for evaluating penicillin allergies and how to safely use cephalosporins in penicillin-allergic patients
Michigan Antibiotic Resistance Reduction Coalition (MARR) *Requests for posters and brochures may be completed through the MARR website or by emailing info@mi-marr.org; please include shipping address and quantity requested*		
Information for patients	http://www.mi-marr.org/appropriate-antibiotic-use/antibiotics-dentist-office.php	Free patient brochures are available
Resources for dental providers	http://www.mi-marr.org/dental-provider.php	Customized Dental Provider Commitment posters can be requested Links to AAOS AUC provided

days.[12] Interestingly, many dental software packages are pre-programmed to prescribe 10 days of antibiotics; however, these templates are easily modifiable.

What to do with leftover antibiotics is a dilemma that should be discussed with patients if they require less than the prescribed seven days of therapy. A recent survey conducted by University of Michigan reported that nearly 2 in 3 (65%) older patients kept leftover antibiotics, with the majority indicating that they did so in case of a subsequent infection.[13] Antibiotics should not be disposed in the sewer system but rather should be brought to a facility that can properly dispose the drug. The Michigan Department of Environment, Great Lakes and Energy (see Table 3) provides an interactive map on its website that identifies pharmacies and other sites throughout the state that accept unused medications. Additionally, the Michigan Pharmacists Association hosts an annual Medication Disposal Event at the Michigan Capitol.

Table 3 — Resources to Promote Antibiotic Stewardship in Dentistry (cont'd)

Title	Website	Resources Provided
	Other Resources	
AAOS Appropriate Use Criteria: Management of Patients with Orthopaedic Implants Undergoing Dental Procedures	https://aaos.webauthor.com/go/auc/terms.cfm?auc_id=224995&actionxm=Terms	Online tool that can be used to determine if patient with a prosthetic joint requires prophylaxis
American Association of Endodontists: Antiobiotic Prophylaxis Quick Reference Guide — 2017 Update	https://www.aae.org/specialty/clinical-resources/guidelines-position-statements/	Position statement that summarizes the 2014 AHA/ADA Guideline. A table of recommended antibiotic regimens, including for pediatrics and patients unable to take oral medication, is provided
Peggy Lillis Foundation	https://peggyfoundation.org/	The PLF is building a nationwide *clostridium difficile* awareness movement by educating the public, empowering advocates, and shaping policy. The website contains important information for providers and patients. Patients are invited to share their stories about *C. diff.*
Michigan Department of Environment, Great Lakes, and Energy	https://www.michigan.gov/egle/0,9429,7-135-3312_4118_74618—,00.html	An interactive map that identifies pharmacies and other sites throughout the state that accept unwanted medications
OSAP (Organization for Safety, Asepsis, and Prevention): Antibiotic/Antimicrobial Resistance Toolkit	https://www.osap.org/page/AntiBioticResisToolk	Toolkit that provides regulations and guidelines, best practices, instructional resources, and patient resources to promote stewardship principles in dentistry

Resources for prescribing antibiotics in dentistry

Patients may come to a dental appointment expecting that an antibiotic will be prescribed. Managing patient expectations requires a commitment by the entire dental team to become good antibiotic stewards. All staff should be prepared to provide a consistent message about appropriate antibiotic use in oral infections. There are numerous resources available to help clinicians prescribe responsibly and to help with patient education efforts. See Table 3, Pages 35 and 36, for resources for dental providers and patients to promote antibiotic stewardship efforts in dentistry.

Several interventions have been shown to be low-cost methods for modifying patient expectations and ultimately reducing inappropriate antibiotic prescribing. In particular, inappropriate antibiotic prescriptions for acute respiratory infections were reduced after clinicians displayed a poster in their exam rooms committing to prescribing antibiotics appropriately.[14] In this light, the Michigan Antibiotic Resistance Reduction Coalition has developed Dental Provider Commitment posters that may be personalized with an office logo.

On the ADA webpage that includes the new guidelines, the ADA has made available a patient video titled "Why Your Dentist May Not Prescribe Antibiotics." This short (1:20) video is also available in Spanish. A link to the "For the Patient" article that summarizes the key information of the guidelines in plain language can be accessed on the ADA guideline webpage.

Delayed prescribing or watchful waiting

The delayed prescribing of antibiotics is a technique that can be used by health care providers to reduce unnecessary prescribing. In this method, dental health professionals advise their patient to only use their prescription after 24 to 48 hours (or return to the office) if their symptoms worsen or do not improve. Regardless of whether DCDT is immediately available, antibiotics are generally not indicated if the patient presents with only pain. The practice of delayed prescribing should be considered in situations where DCDT is not immediately available. In the case of a compliant patient, the dentist may opt to provide him or her with an antibiotic prescription and provide instructions to not fill the prescription unless the symptoms worsen.

Summary

To help combat the spread of antibiotic resistant infections and to promote stewardship initiatives, the American Dental Association now encourages a paradigm shift for the use of antibiotics in dentistry from "just in case" to "only use when necessary." This stewardship initiative applies to all antibiotic prescriptions including those for prophylactic purposes and the recently published guidelines for the urgent management of oral infections in immunocompetent adults. Best practices for antibiotic prescribing include an awareness of the right dose and right duration of these medications and of adverse effects of use, including *Clostridiodes difficile* infection and penicillin allergies. The ADA and the Michigan Antibiotic Resistance Reduction Coalition provide resources for dental personnel to implement the new guidelines and provide tools, literature, and educational resources for dental team members and their patients.

References

1. Fluent MT, Bailey EM. Antibiotic Stewardship in Dentistry: Opportunities and Challenges. J Mich Dent Assoc 2019;10:40-44.
2. Center for Disease Control and Prevention. Core Elements of Outpatient Antibiotic Stewardship. Available at: https://www.cdc.gov/antibiotic-use/community/pdfs/16_268900-A_CoreElementsOutpatient_508.pdf. Accessed 7/20/19.
3. Lockhart PB, Tampi MP, Abt E et al. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling. J Am Dent Assoc

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